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(54) **Peripheral telecommunications hub for personal computer.**

(57) In a computer telephony integration system for implementing integrated computing and telephony applications, wherein the system has at least one server with an internal control bus, the invention comprising a peripheral telecommunications hub connected to the server via a extension of the internal control bus for accommodating one or more telecommunications cards and providing appropriate power supply and signalling for operation of the telecommunications cards under control of the server while physically isolated therefrom.

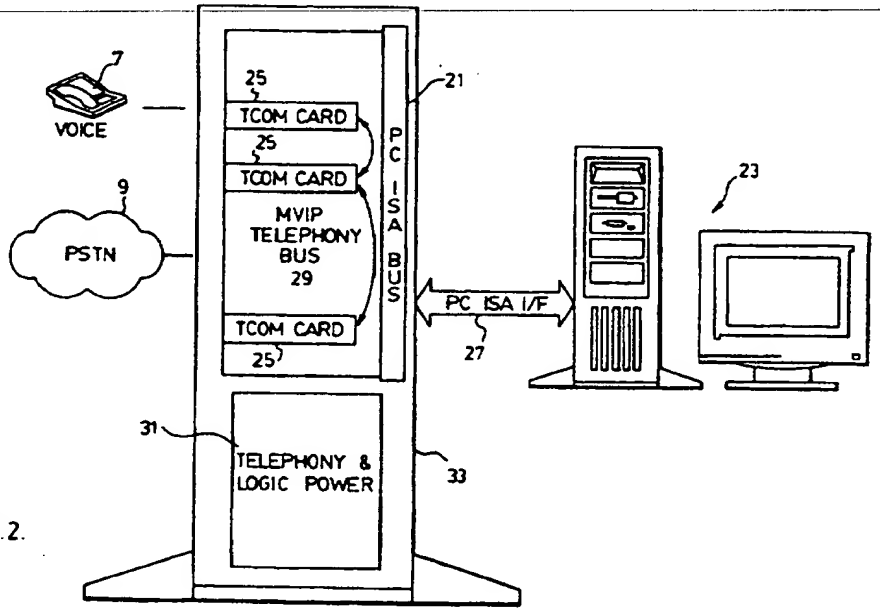


FIG.2.

GB 2 318 480 A

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

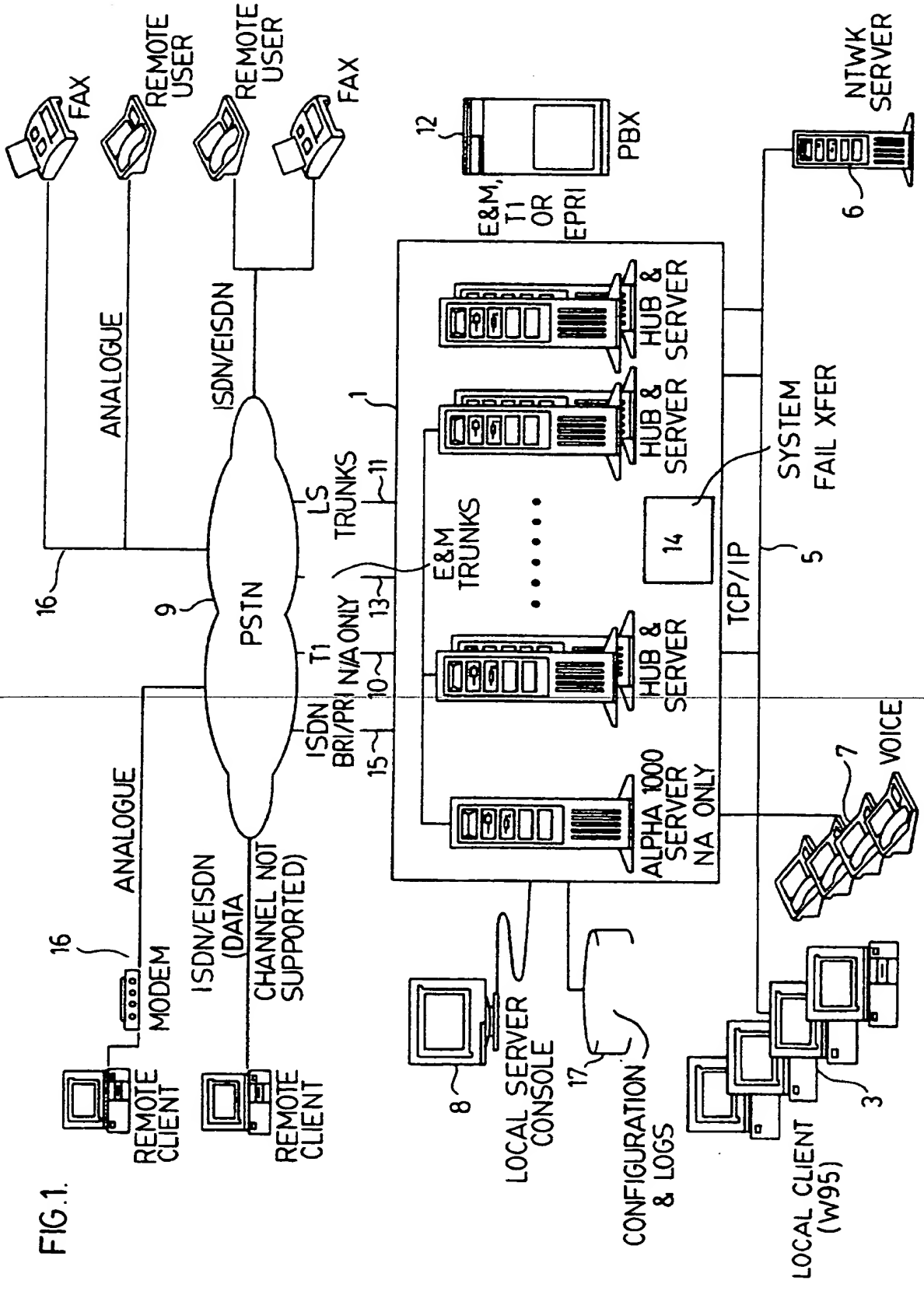

FAX
REMOTE USER
REMOTE USER
FAX
ANALOGUE
ISDN/EISDN
16
9
PSTN
LS TRUNKS
11
E&M TRUNKS
13
T1 N/A ONLY
10
ISDN BRI/PRI
15
1
12
PBX
E&M, T1 OR EPRI
HUB & SERVER
HUB & SERVER
HUB & SERVER
14
ALPHA 1000 SERVER NA ONLY
TCP/IP
5
SYSTEM FAIL XFER
6
NTWK SERVER
7
VOICE
ANALOGUE
16
MODEM
REMOTE CLIENT
ISDN/EISDN (DATA CHANNEL NOT SUPPORTED)
REMOTE CLIENT
8
LOCAL SERVER CONSOLE
17
CONFIGURATION & LOGS
3
LOCAL CLIENT (W95)

FIG.1.

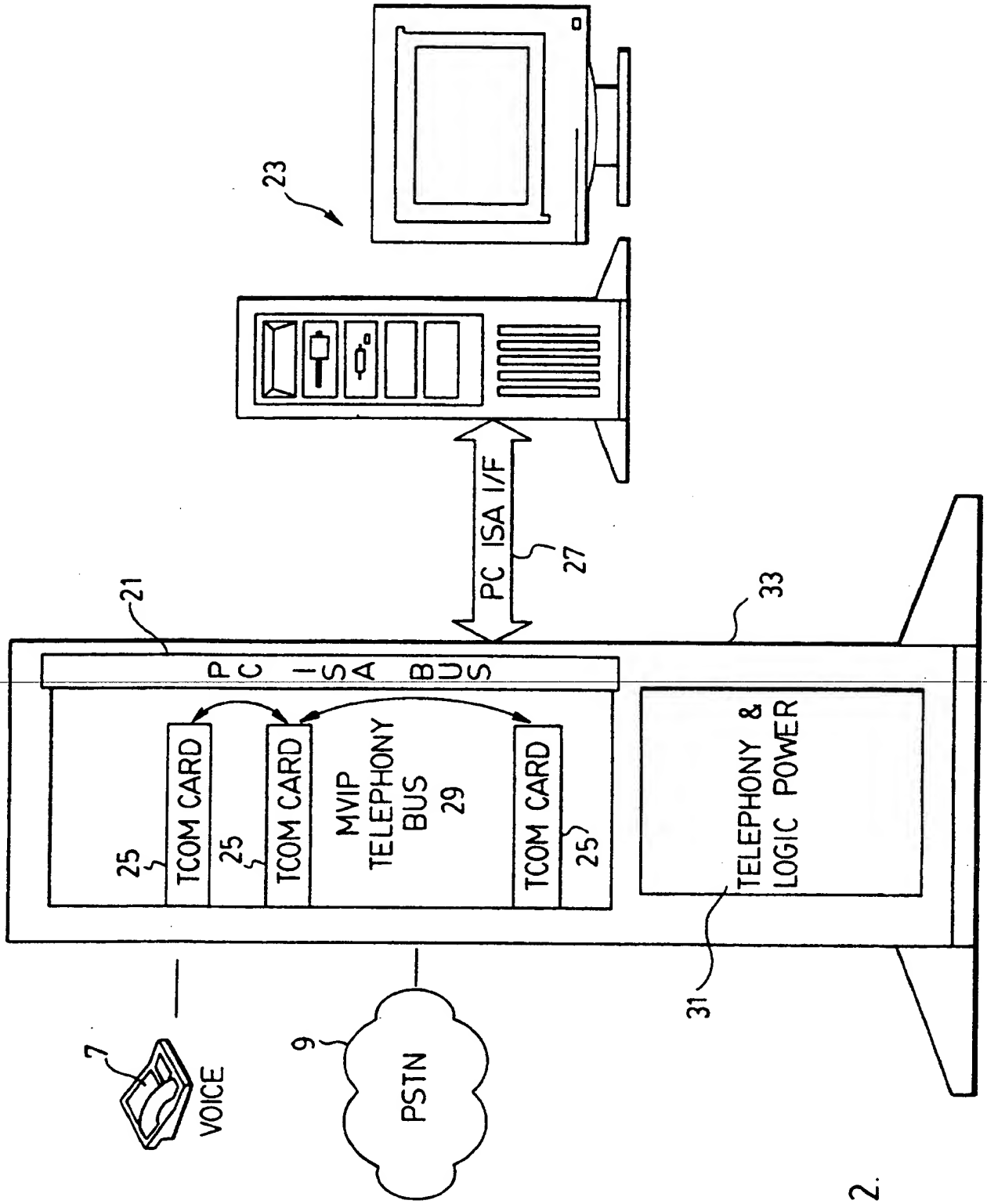
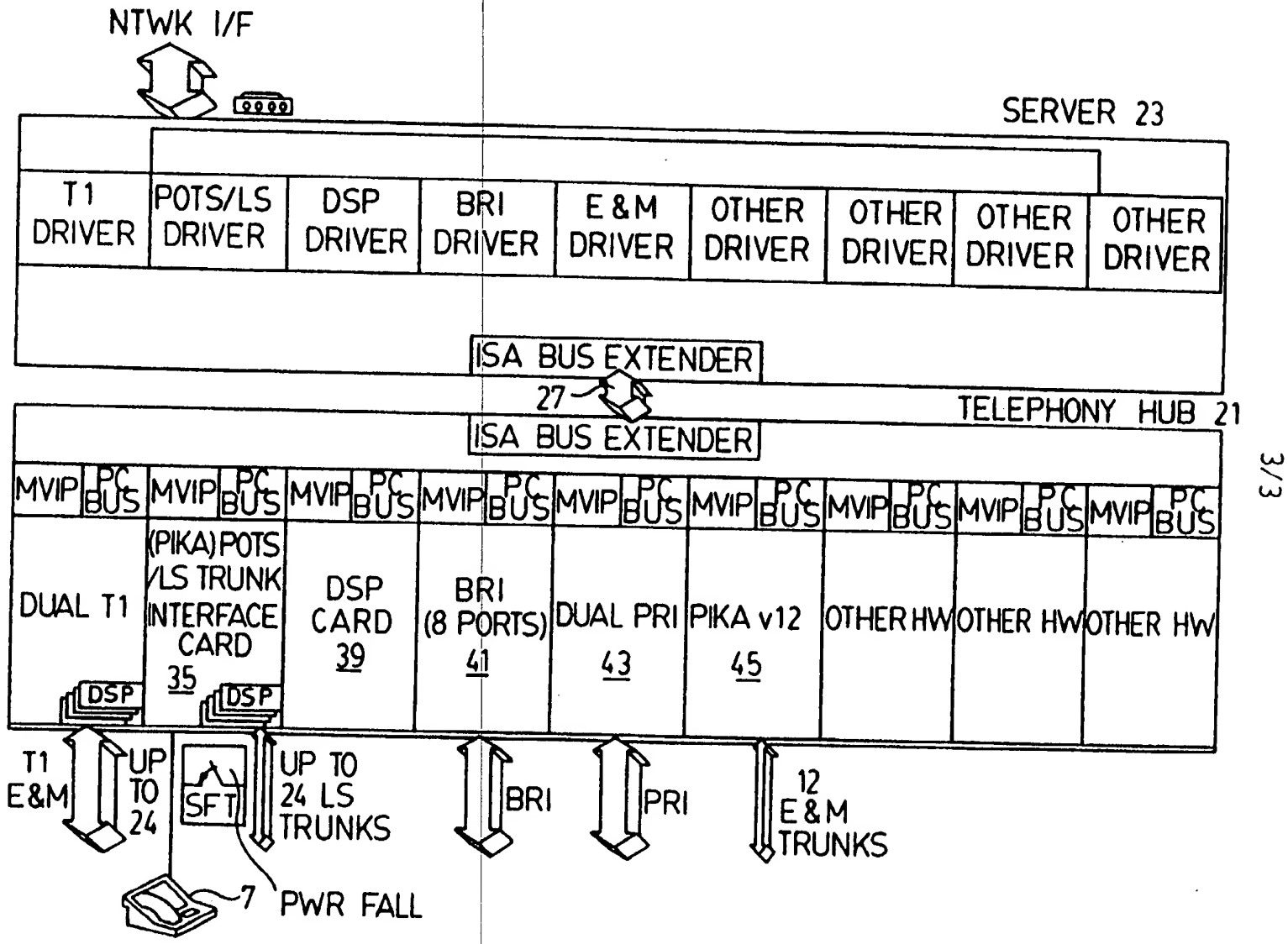

23
PC ISA I/F
27
21
33
PC ISA BUS
TCOM CARD
25
TCOM CARD
25
MVIP
TELEPHONY
BUS
29
TCOM CARD
25
TELEPHONY &
LOGIC POWER
31
7
VOICE
9
PSTN

FIG.2.

FIG.3.


NTWK I/F
SERVER 23
T1 DRIVER
POTS/LS DRIVER
DSP DRIVER
BRI DRIVER
E&M DRIVER
OTHER DRIVER
OTHER DRIVER
OTHER DRIVER
OTHER DRIVER
ISA BUS EXTENDER
27
TELEPHONY HUB 21
ISA BUS EXTENDER
MVIP
PC BUS
DUAL T1
DSP
(PIKA) POTS /LS TRUNK INTERFACE CARD 35
DSP CARD 39
BRI (8 PORTS) 41
DUAL PRI 43
PIKA v12 45
OTHER HW
T1 E&M
UP TO 24
SFT
UP TO 24 LS TRUNKS
BRI
PRI
12 E&M TRUNKS
7
PWR FALL

PERIPHERAL TELECOMMUNICATIONS HUB FOR PERSONAL COMPUTER

Field of the Invention

The present invention relates in general to computer telephony integration (CTI), and more particularly to a peripheral cabinet which, when connected to a personal computer (PC) via an extension of the PC bus, provides a telephony-capable environment for one or more telecommunications cards housed therein, without power supply and connectivity constraints of the host PC.

Background of the Invention

Prior art CTI systems are known in which telecommunications cards, such as fax cards, call answering systems, etc., are integrated into a host PC cabinet. Integration of telephony cards into the PC cabinet has been found to be acceptable where there are only a limited number of installed cards. However, when full telecommunications functionality is required (e.g. cross point switching of telephone lines), significant problems present themselves when attempting integration of a multitude of telecommunications cards into OEM PC cabinets. These problems arise from the fact that telecommunications cards (e.g. line cards and trunk cards) are characterized by different power requirements than off-the-shelf PCS, and that bus connectivity is limited by the PC cabinets. More particularly, existing computers/servers do not normally provide for a number of common telephony requirements, such as:

I. The provision of a ringing power supply (90 VAC/-48 VDC) for POTS lines (Plain Old Telephone Sets);

ii. Higher -5 volt power requirements than are provided in standard PC supplies (96 POTS lines and 48 Loop Start trunks require approximately 2 Amps of -5v power for these boards alone, compared to 500 mAmps sourced); and

iii. No special telephony grounding is provided.

Other prior art systems are known which provide an interface between one or

more PCS and a PBX or other telephony equipment. For example, U.S. Patent 4,866,758 (Heinzelmann) discloses a phone management server which functions as an interface between a local area network and a digital PBX. The server communicates with the network using a STARLAN signalling protocol and incorporates a Digital Communications Protocol Interface for permitting the server to communicate with the PBX, with bidirectional protocol translation of messages between the LAN and the PBX. U.S. Patent 5,402,474 (Miller et al) discloses a programmable interface between a workstation and an archive server to automatically store information derived from a telephone transaction, such as billing data, telephone numbers, etc.U.S. Patent 4,782,517 (Bernardis et al) discloses a server switch which is connected between a telephone and a local switch such as a PBX. The server switch is controlled by a processor for effecting connections between the telephone, local switch and built-in ringing circuit, receiver/sender, and tone generator. U.S. Patent 5,333,266 (Boaz et al) discloses an integrated messaging system in the form of software for integrating voice mail, email, fax, etc.

Summary of the Invention

In accordance withe the present invention, a peripheral cabinet is provided which attaches to a PC and provides a telephony-capable environment. By providing a separate cabinet for the telephony components, the power and connectivity problems associated with PC integration are overcome, resulting in a telecommunications hub design that is not limited to the design details of the host PC. All control is provided in the PC host, whereas switching and telecommunications functions are performed in the telecommunications hub (peripheral cabinet). The peripheral cabinet is connected to the host PC via an extension of the PC's ISA bus.

According to the present invention, no complex digital PBX is required (as in U.S. Patent 4,866,758), and the telecommunications hub is connected as a logical extension of the host PC, rather than serving as a complicated protocol interface between the LAN and a PBX. Instead, the telecommunications hub of the present invention communicates with POTS telephones and the Public Switched Telephone

Network (PSTN). Nor does the telecommunications hub of the present invention function as an interface between a workstation and an archive server, as disclosed in U.S. Patent 5,402,474 (Miller et al). In contrast with the system of U.S. Patent 4,782,517 (Bernardis et al), which discloses a server switch for effecting programmable interconnections between a telephone set and a ringing circuit, receiver/sender, tone generator or local switch, and the system of U.S. Patent 5,333,266 (Boaz et al) which discloses a software-based integrated messaging system, the telecommunications hub of the present invention provides a telephony cabinet which is capable of housing telecommunications cards of the variety disclosed in U.S. Patent 4,782,517 and a PC for implementing software of the variety disclosed in U.S. Patent 5,333,266 (Boaz et al).

Brief Description of the Drawings

A detailed description of the preferred embodiment is provided herein below, with reference to the following drawings in which:

Figure 1 is a schematic illustration of a PC-based communications system incorporating the peripheral telecommunications hub of the present invention;

Figure 2 is a schematic illustration of the peripheral telecommunications hub according to the present invention; and

Figure 3 is a schematic illustration of hardware modules and drivers of the peripheral telecommunications hub according to an embodiment of the invention.

Detailed Description of the Preferred Embodiment

Figure 1 depicts connections between a computer/telephony integration (CTI) system 1 which incorporates one or more telecommunications hubs according to the invention, and various external equipment. As such, Figure 1 represents the environment in which the peripheral telecommunications hub of the present invention

is intended to operate. The system 1 uses a Client/Server model wherein the server components of the CTI applications reside on the server platform(s) and the client components reside on user desktop PCS.

As discussed in greater detail below with reference to Figure 2, each of a plurality of servers within the CTI system 1 is connected to a peripheral telecommunications hub. Each hub and server is connected to one or more local clients, other servers, local POTS (Plain Old Telephone Set) equipment and the PSTN (Public Switched Telephone Network). For instance, as shown in Figure 1, local clients 3 are connected to the CTI system servers 1 via a TCP/IP network 5 under control of network server 6, or remotely as discussed below.

The CTI system 1 may also be connected to a local server console 8, configuration and logs database 17 and/or PBX 12. Also, a system fail transfer module 14 is included for providing basic telephone service to some of the connected devices in the event of a total power failure, according to well known techniques.

POTS devices 7 are connected to POTS interface modules within each telecommunications hub (e.g. up to 24 devices per module), with each POTS device 7 being associated with a respective client account in a configuration database to allow the integration of computer and telephony features.

The architecture of the CTI system 1 also supports connections to the PSTN 9 via T1 trunks 10, service loop start trunks 11, E&M trunks 13, ISDN BRI (Basic Rate Interface) and PRI (Primary Rate Interface) trunks 15. Therefore, remote users and clients can access the CTI system 1 using voice, fax and computer equipment 16 connected to the PSTN 9 over traditional (analogue) connections and over ISDN connections (at the remote site).

Turning to Figure 2, the peripheral telecommunications hub 21of the present invention is shown in greater detail with its associated host PC server 23. All control is provided by the host PC 23 whereas switching and telecommunications functions

are implemented in the telecommunications hub 21. A plurality of telecommunications cards 25 within hub 21 communicate with the host PC 23 via an extension of the PC ISA bus 27, and pass voice data over an internal MVIP (Multi-Vendor Integration Protocol) telephony bus 29. The ISA bus interface 27 for the telephony cards 25 is an extension of the ISA bus in the PC 23. There are two bus extension boards: one in the PC 23 and one in the hub 21. Each hardware module or card 25 has a driver for providing hardware-level control downward. Upward, each driver supports the MVIP-90 commands for routing voice between the cards 25, and Service Provider Interface (SPI) commands for application programming within the server 23. The MVIP-90 protocol is used to exchange voice data over bus 29. This protocol defines the bus hardware, signalling, and commands to allow the voice circuits to be configured. These commands are supported by the drivers, and all drivers provide a common set of commands to higher levels of software, as discussed above. Driver control software within the servers controls the voice circuits between the hardware elements through their drivers. Finally, a power supply 31 provides power to both logic and telephony equipment within the hub 21 (i.e. +/- 5v, +12v, ringing and battery voltages). Since the hub 21 incorporates all of the required telecommunications functionality, the hub may be physically isolated from the host 23 and therefore provide all necessary specialized signalling and power levels.

In terms of physical construction, the hub 21 comprises a PC tower 33 housing a frame, fan, skins and some custom metalwork. The passive ISA backplane 27 is connected to a pair of ISA to ISA bus extension cards (one for the PC host and one for the hub cabinet). The ISA bus extension cards extend the PC host bus to the telecommunications hub's ISA bus. According to a first embodiment, an off-the-shelf ISA-to-ISA connector is used whereas according to an alternative embodiment, a PCI-to-ISA is used.

Turning finally to Figure 3, the hardware and driver architecture is illustrated for an embodiment of the system shown in Figure 2. Each telecommunications card 25 includes an interface to the MVIP bus 29 and ISA backplane 27 within the hub 1. For each card 25 within the hub 1, a corresponding software driver is provided within

the server 23, which communicates with and controls the associated one of the cards 25 via the ISA bus extension 27.

Within the hub 1, Pika Daytona® 12/24 POTS interface cards 35 are used to connect up to 24 telephones 37 for providing DTMF detection, speech compression, DSP voice processing and speech recognition/tone detection. The POTS interface cards 35 also provide a talk battery/ring voltage (48 VDC/90 VAC) power supply interface. A DSP card 39 provides DSP resources for line processing, trunk processing, text-to-speech conversion and automatic speech recognition for port and line signal processing within the system. In particular, software embedded within the DSP card 39 provides DTMF detection and generation, speech compression/synthesis and playback, speech recording and playback, call progress tone detection, fax tone detection and modem, automatic gain control, voice conferencing, dial pulse detection and speech recognition. An SLine module provides eight ISDN BRI ports 41, and a dual Euro-PRI card 43 with Euro-ISDN stack/driver provides a Euro-PRI interface for 30 voice channels per control channel (i.e. 30 or 60 trunks for a single or dual span). A Pika v12 card 45 provides an interface to upto 12 E&M trunks.

A person understanding the present invention may conceive of other embodiments or variations therein. For example, it is contemplated that the hub 1 may be provided with a PCI backplane. All such embodiments and variations are believed to be within the sphere and scope of the invention as defined in the claims appended hereto.

CLAIMS:

1. In a computer telephony integration system for implementing integrated computing and telephony applications, said system having at least one server with an internal control bus, the improvement comprising a peripheral telecommunications hub connected to said server via an extension of said internal control bus for accommodating one or more telecommunications cards and providing appropriate power supply and signalling for operation of said telecommunications cards under control of said server while physically isolated therefrom.

2. The telecommunications hub of claim 1wherein said one or more telecommunications cards communicate with said server over said control bus and pass voice data over an internal telephony bus.

3. The telecommunications hub of claim 1 further including one or more software drivers within said server for respective ones of said telecommunications cards.

4. The telecommunications hub of claim 1 wherein said power supply and signalling includes +/- 5v, +12v, ringing and battery voltages.

5. The telecommunications hub of claim 2 wherein said internal telephony bus is a MVIP-90 bus.

6. The telecommunications hub of claim 1 wherein said control bus is a PC ISA bus.

7. The telecommunications hub of claim 6 further comprising an ISA bus extension card in each of said hub and said server.

8. The telecommunications hub of claim 1 further comprising a PC tower housing a frame, fan, skins and custom metalwork.

9. The telecommunications hub of claim 7 further comprising an ISA backplane. connected to said ISA bus extension card in each of said server and said hub.

The Patent Office

9

Application No: GB 9720337.6 **Examiner:** Ken Long
Claims searched: 1 to 9 **Date of search:** 11 February 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): H4K (KDC, KDX, KRX KOT, KOX, KOD4, KSX, KWX, & KTC)

Int Cl (Ed.6): H04Q 11/04 & 3/545
H04M11/00

Other: ONLINE : WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	EP 0192894 A2	OLIVETTI (page 1 lines 21-24, page 2 lines 18-23, page 3 lines 16-20 and page 3 line 27 to page 4 line 1)	Claim 1 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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